R. A. Frank C-273

GEJ-2161

Instructions

TYPE AK-1A

Hook-On

VOLT-AMMETER

GENERAL ELECTRIC

TYPE AK-1A
Hook-On Volt-Ammeter

INTRODUCTION

The General Electric Type AK-1A hook-on volt-ammeter has been designed for the measurement of current and voltage in a-c circuits. The hook-on feature permits readings to be taken on insulated or uninsulated circuits without any interruption of service.

This instrument permits the measurement of current at full-scale ranges of 7.5, 30, 75, 300, and 750 amperes; and the measurement of voltage in full-scale ranges of 150, 300, and 750 volts. The desired range is obtained by means of a thumb-operated selector switch.

In addition, the Type AK-1A volt-ammeter is provided with a pointer-stop mechanism, which permits the measurement of current surges (such as motor-starting currents) and voltages of short duration. This mechanism is controlled by a slotted knob located on the front of the instrument window.

These instructions do not purport to cover all details or variations in equipment nor to provide for every possible contingency to be met in connection with installation, operation or maintenance. Should further information be desired or should particular problems arise which are not covered sufficiently for the purchaser's purposes, the matter should be referred to the General Electric Company.

OPERATION

OPERATING LIMITS

Note: D-C currents and voltages cannot be read on this instrument.

The Type AK-1A volt-ammeter has an accuracy of ±3% of full-scale on all the ranges at frequencies from 50 to 70 cps, at a reference temperature of 77 F. At other temperatures there may be deviations from the specified accuracy, but for all practical purposes they can be neglected in the range from 32 F to 110 F.

At frequencies between 70 and 400 cycles, and between 25 and 50 cycles, additional errors may result.

Note: The instrument is sensitive to wave form; therefore, errors will be introduced when measuring other than sine-wave currents or voltages.

For the best accuracy, always close the hook tightly and keep the jaws clean.

It is essential that only the conductors being measured pass inside the hook. Other conductors will have little effect on the reading; but for highest accuracy, it is recommended that they be as far as possible from the hook.

OPERATING PRECAUTIONS

Warning: Safety rules and precautions should be strictly complied with in the measurement of currents and voltages. In addition, this instrument should not be

used in the measurement of current in circuits above 750 volts unless the conductors themselves are adequately insulated to withstand the circuit voltage; or unless the instrument is used with an extension pole.

If this instrument is used with a current or potential transformer, the recognized safety precautions applying to the use of current or potential transformers should be followed. (Ground the secondary; when using a current transformer, do not open the secondary circuit without first short-circuiting the secondary terminals; etc.)

OPERATING STEPS

When measuring unknown currents or voltages, set the selector switch on the highest range for the quantity being measured; then turn to a lower range, if necessary, to get an indication well up on the scale.

The scale reading corresponding to each switch position is shown below:

Switch Position	Scale Reading
750 Amps	Top red and black numbers
300 Amps	Middle red and black numbers
75 Amps	Top black numbers only
30 Amps	Middle black numbers only
7.5 Amps	Top black numbers only
750 Volts	Top red and black numbers
300 Volts	Middle red and black numbers
150 Volts	Bottom black numbers

When measuring current proceed as follows:

1. Open the transformer hook by a slight pull on the hook as shown in Fig. 1.

2. Put the hook around the conductor and push on the handle as shown in Fig. 2.

Caution: The hook, although insulated from the remainder of the instrument, is metallic; therefore, to prevent short circuits, keep the hook away from adjacent bare conductors or grounded surfaces.

3. Take a reading.

4. Remove the instrument by exerting a gentle pull on the handle as shown in Fig. 3.

When measuring voltage, first connect the potential leads to the two binding posts on the front of the instrument as shown in Fig. 4. Then clip the other ends of these leads to the circuit. When removing the instrument, always disconnect the clip leads from the circuit first.

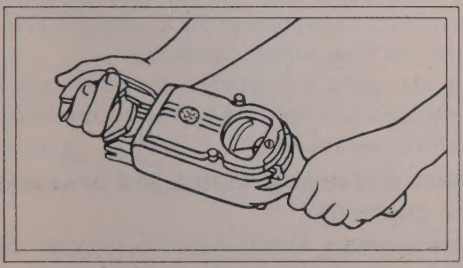

Fig. 1. A slight pull with finger and the hook snaps open.

When measuring current and voltage in the same circuit, make the connections described above for both quantities. See Fig. 5. Turn the selector switch to the appropriate ranges, and take each reading separately.

USE OF POINTER-STOP MECHANISM

To make approximate measurements of currents or voltages that have a duration of less than two seconds, proceed as follows:

With the instrument connected, set the selector switch on the range that results in a momentary deflection well up on the scale. Turn the pointer-stop knob clockwise (moving the pointer upscale) until the deflection of the pointer from the pointer-stop is just barely noticeable during repeated applications of the measured quantity. In some measurements, it may be necessary to switch to a higher range before a final reading can be obtained.

Note: The accuracy of such measurements is dependent on the duration of the quantity. The accuracy improves with longer durations.

When not using the pointer-stop mechanism, the pointer-stop knob should be turned to the maximum counterclockwise position.

EXTENDING INSTRUMENT RANGE FOR MEASUREMENT OF LOW CURRENTS

Full-scale ranges lower than 7.5 amperes can be obtained by passing the conductor two or more times through the hook. For two passes through the hook,

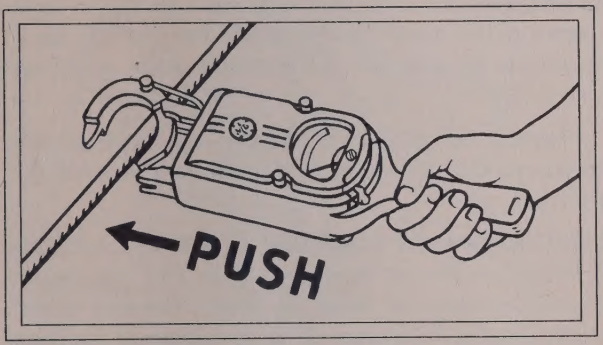

Fig. 2. Put the hook around conductor and push on handle.

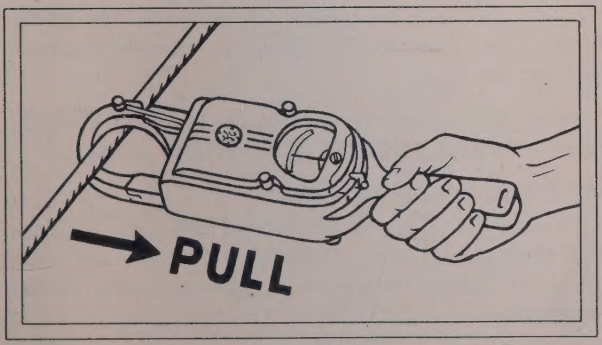

Fig. 3. When reading has been obtained, a gentle pull on handle releases conductor.

the full-scale range becomes 3.75 amperes ($\frac{7.5}{2}$); for three passes 2.5 amperes ($\frac{7.5}{3}$), etc. In Fig. 6, three passes of the conductor are made through the hook; therefore, for example, the full-scale range is 2.5 amperes ($\frac{7.5}{3}$).

Passing the conductor through the hook loosely improves the accuracy in the measurement of low currents.

MEASUREMENT OF CURRENTS ABOVE 750 AMPERES

When measuring currents above 750 amperes, a current transformer must be used. Connect a conductor to the secondary of the transformer and pass this conductor through the hook once, or more times, if necessary, to get a satisfactory deflection. See Fig. 7. To obtain the actual value of the line (primary) current, multiply the indicated value by the transformer ratio, and then divide by the number of passes through the hook.

Note: Follow safety precautions as mentioned in section OPERATING PRECAUTIONS on page 3.

VOLTAGES ABOVE 750 VOLTS

When measuring voltages above 750 volts, a potential transformer must be used. Connect the volt-ammeter voltage terminals to the secondary of the transformer.

Note: Follow safety precautions as mentioned in section OPERATING PRECAUTIONS on page 3.

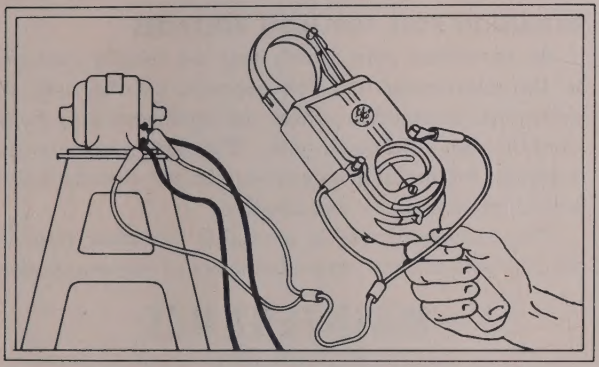

Fig. 4. Connect leads to terminals on front of instrument to measure voltage.

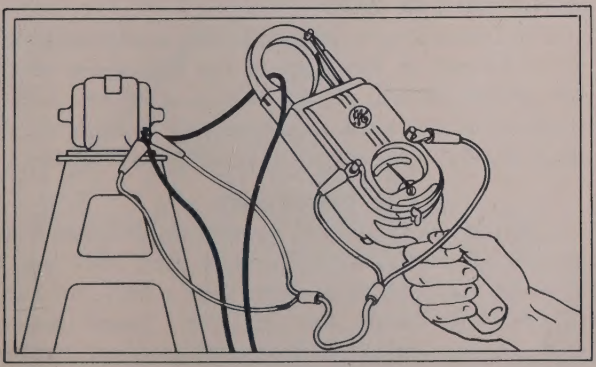

Fig. 5. Connect voltage leads and pass the conductor through the hook to measure current and voltage on same setup.

EXTENSION POLE FOR HIGH VOLTAGES

An extension pole, which may be readily clamped to the instrument in a few seconds, can be used for additional protection when the instrument is being used on high-voltage circuits. This pole also provides a means for making measurements on circuits which would otherwise be inaccessible.

The extension pole is available in either four- or six-foot lengths from manufacturers of line equipment.

MAINTENANCE

Keep the jaws of the hook clean by wiping occasionally with an oily cloth. Waxing the hook laminations will preserve their finish.

ADJUSTMENT OF ZERO

The instrument is provided with a zero-adjusting screw located on the front of the instrument above the selector switch. If the pointer is off zero before connections are made, adjustment for zero should be made carefully by means of a small screwdriver.

SERVICING

If you need to repair, recondition, or rebuild any electric apparatus, a G-E service shop near you is available day and night, seven days a week, for work in the shops or on your premises. Latest factory methods and genuine G-E renewal parts are used to maintain the original performance of your electric equipment.

When you need parts only, to replenish those you

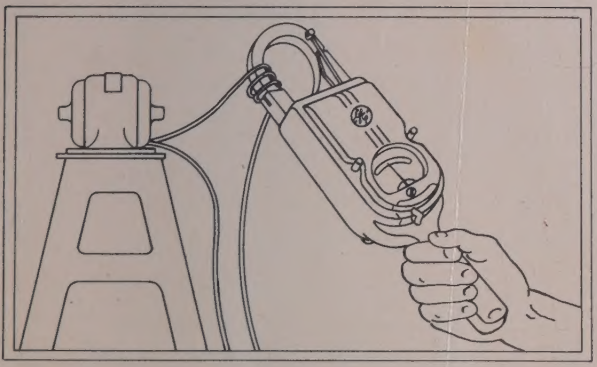

Fig. 6. Pass the conductor two or more times through the hook to obtain accurate reading of low current. **See page 6.**

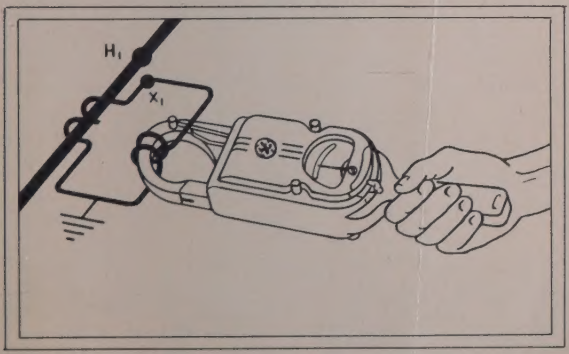

Fig. 7. When using a current transformer, pass the conductor connected to the secondary once or more times through the hook. *See page 8.*

stock as "production insurance," your General Electric representative will service your request. Plan to stock and order far enough in advance to assure an adequate supply to meet normal requirements.

The services of G-E factories and engineering divisions are always available to help you with your electrical problems. For full information about these services, contact the nearest General Electric service shop or sales office.

OTHER GENERAL ELECTRIC HOOK-ON INSTRUMENTS

Type AK-2 Hook-On Wattmeter

This is a portable instrument for measuring a-c power quickly and easily. In addition to measurement of single-phase and polyphase kilowatts, the instrument will measure vars in balanced three-phase circuits.

Type AK-3 Hook-On Power-Factor Meter

This G-E hook-on instrument measures power factor directly. It incorporates all the features of portability, convenience, and direct reading that have proved to be popular benefits in the AK-1A and AK-2 instruments. The AK-3 may be used on any balanced three-phase circuit.

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Further information on the AK-2 and AK-3 can be obtained from your nearest General Electric representative. Ask for bull[illegible] he Distribution Section, Ge[illegible]e-nectady, New York.

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